work done. Perfect circulation is simply another term for perfect repairing, because action and reaction are equal.

To watch this perfect physical poise, and give little thought to kind of work or hours required, would be doing the same thing as the engineer with regard to the steam gauge. A body improperly set up cannot be expected to give long hours of service, and it is unfair to demand it until definite instruction is given on this subject, and the nurse shows a practical understanding of the principles.

ARTIFICIAL FEEDING OF INFANTS

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The ideal food for infants is breast milk, but if for any reason the mother is unable to nurse her child, cow's milk can be *modified*. That is, we alter the cow's milk and make it as near the strength and quality of human milk as we can. Necessarily, milk secreted to nourish the calf is not suited to the requirements of the human infant, for not only is there a difference in the *proportion* of food stuffs, but also in the character and behaviour of them. Roughly speaking, the analysis is as follows:

COW'S MILK	
Fats	4 per cent.
Sugar	4½ per cent.
Proteids	3½ per cent.
Salts	¾ per cent.
Water	87¼ per cent.
	100 per cent.

HUMAN MILK	
Fats	4 per cent.
Sugar	7 per cent.
Proteids	1½ per cent.
Salts	⅕ per cent.
Water	87 per cent.
	100 per cent.

HUMAN MILK PROTEID	
Lactalbumin	$1\frac{26}{100}$ per cent.
Casein	$1\frac{3}{100}$ per cent.

COW'S MILK PROTEID	
Lactalbumin	$\frac{53}{100}$ per cent.
Casein	$3\frac{2}{100}$ per cent.

We see by this that the percentage of *fats* is alike, but the globules in cow's milk are much larger and more difficult to digest on account of the large amount of volatile fatty acids present in cow's milk. The *sugar* of both cow's and human milk is identical in composition, it is lactose in solution. The difference in amount, however, is considerable.

The *proteids* of cow's milk are not only present in a much larger proportion than in human milk, but they show marked difference in character.

The *casein* of cow's milk is readily coagulated by rennet, acids, and by gastric juice. The curd formed is tough and firm, and dissolves slowly by the action of the digestive fluids. The casein of human milk is not regularly coagulated, and only slightly and with difficulty by acids. The curd formed by the gastric juice is loose and flocculent, and it is readily and completely dissolved. It is this difference in the proteids which presents the greatest difficulty in the use of cow's milk for infant feeding.

The *reaction* of cow's milk, though alkaline when freshly drawn, soon becomes acid, thus we have added the alkali (*viz.*, lime water). Human milk is alkaline. Cow's milk always contains a large number of bacteria, which increase in proportion to the age of the milk. Human milk is either sterile or contains a few cocci from the milk ducts.

As cow's milk is most available for substitute feeding of the infant, we must be sure that it is properly handled. It must be fresh (never over twenty-four hours old), it must contain no preservatives, it should be from healthy animals (free from tuberculosis, etc.), properly stabled and fed. It should be taken from mixed or herd cows instead of from a single animal. The grade cows, or common red cows, are preferable to Jersey or highly bred animals, as the former are stronger, less subject to disease and other influences which affect milk.

We may obtain milk from the laboratory, from selected clean farms, or from stores, but the latter should never be used for an infant if it is possible to prevent it, as it is scarcely ever pure or untainted. Many infants lose their lives or contract severe illnesses, especially in summer, from the poison in store milk.

The laboratories were started in 1893, and undertake to furnish "modified milk" of any desired porportions upon the prescription of the physician. The elements chiefly used in the Walker-Gordon Laboratories are (1) cream containing sixteen per cent. fat, (2) separated milk, from which fat has been removed by the centrifugal machine, (3) a standard solution of milk sugar, twenty per cent. in strength. Prescriptions can be made very accurately from these materials, and lately, by using whey, a second modification of the proteids has been accomplished, so that a larger proportion of lactalbumin than casein can be used.

When cream is ordered from a laboratory it should be stated whether "gravity" or "centrifugal" cream is desired. The latter is considered most desirable because it can be obtained from fresh milk, while gravity cream is obtained from milk standing at least twelve hours. All milks from the laboratory are delivered in sterile sealed bottles, jars, or tubes, and may be pasteurized or sterilized to any temperature ordered by the physician. It is very expensive, and is therefore not practical in nursing the poor. It costs from fifty to sixty cents a day at least. A mother or nurse should never order prescriptions of milk without the advice of a physician, any more than a prescription of medicine from a druggist. There can be no set rule for strength of food for infants; each individual case must be studied and prescribed for.

We must next consider *home modification* of milk. One of the most important things to teach the mother or nurse about this is that everything that will be required for this work must be bought for the purpose and kept separate from all common kitchen utensils and scrupulously *clean*. In the first place, it is desirable to have a small nursery ice-chest, if possible (these cost about five dollars), to keep cream, milk, and modified milk in, and to be used for nothing else. This must receive most careful daily cleansing with soda water, and be kept in a clean, cool room. Quart glass jars, or bottles with wide mouths, are best for preparing milk or cream. These must be boiled each day before use, putting on in a clean kettle or sauce-pan in cold water, and bringing to a boil. The hands must be thoroughly washed before handling them. It is desirable to have a clean, light room, apart from the house kitchen, where mixtures can be made. We must instruct the mother to put on a clean apron, to scrub the table or put on a clean table-cloth (well ironed), to wash her hands, and everything that she is going to use, and to keep separate glass towels, freshly laundered daily, ready for use. Besides glass quart bottles, she will need a teaspoon, a tablespoon, a quart measure or glass graduate, a two-quart agate sauce-pan, a Walker-Gordon pasteurizer, with bottle-rack or steamer; a funnel, a two quart pitcher, and absorbent cotton.

Milk may be placed in a glass jar for twelve hours. If fat is not removed the whole quart of milk equals four per cent. fat.

There are three ways to remove cream from glass jars:

1. Pouring.
2. By dipper.
3. By siphon.

The physician's prescription for the modification of milk may call for:

Top Milk	4 ounces
Whey	20 ounces
Lime Water	2 ounces
Water	8 ounces
Milk Sugar	3 tablespoonfuls

Put six ounces in each of five bottles. Pasteurize at 167°.

The sugar of milk must be measured and put into a clean quart bottle, and the right amount of boiling water poured upon it. It is then covered and set away to cool; the fat-free milk, and cream are then added. The mixture is then pasteurized at the temperature ordered, cooled, and kept in an ice-chest. The cooling must be done slowly. If taken directly from the pasteurizer and placed on ice, the sudden change of temperature, from 167° to 32°, tends to change the composition of the milk. It may be cooled by placing under running water, starting with warm water and then adding cool as fast as possible, the whole process taking about ten minutes.

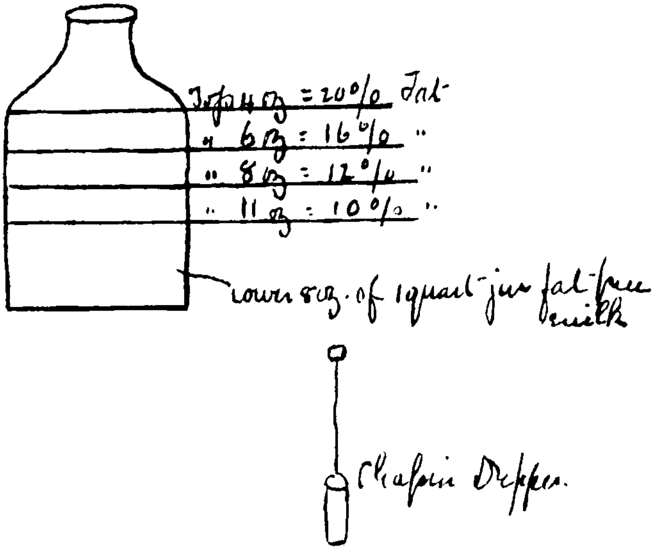

Fig. 1

To make whey, add a teaspoonful of essence of pepsin or liquid rennet, or a junket tablet, to a pint of skim milk. Heat at blood heat, about 100° F., until it coagulates. Break up the curds with a spoon or fork. Strain through a handkerchief. What goes through is whey. Heat whey to 150° F. before mixing it with the cream.

When a feeding is required, the mixture is measured and poured through a funnel into the bottle. A cotton stopper is put in, and the milk heated to 100° F. A clean nipple (which is kept in boiled water and soda bicarbonate) is placed on the bottle without handling the pointed end, the bottle is done up in a cosy or napkin (to keep warm), and taken at once to the baby, without handling or infecting the nipple by allowing it to touch the bed-clothes or the baby's clothes, etc.

The baby must be held during the entire feeding, which should take from eight to fifteen minutes, and it should not be amused or distracted from the business of feeding. If the baby takes the food too rapidly, the hole in the nipple is too large, and a new nipple should be purchased. The nipple should be tested by tipping the bottle upside down, and if the hole is the right size the milk will fall drop by drop. If it runs in a stream it is too large. A hole is made by sterilizing a number 9 sewing-needle red hot and puncturing. This operation may have to be repeated once or twice. After feeding, the bottle and nipple must receive immediate attention, washed thoroughly in running cold water, then in hot soapsuds, the nipple turned inside out, and then replaced in soda solution, and the bottle filled with cold water. Once a day the bottle and nipple must be boiled, and all new nipples must be boiled before using.

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